

# Department of Biological Sciences

## **Dr. David W. Sammons, Chair**

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## **Faculty**

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*Lab Instructor: Donna K. Forbess*

## **Mission**

The Department of Biological Sciences' mission is to offer a diverse program designed to acquaint students with a broad, representative knowledge of biological principles. In addition to providing courses designed to meet the needs of biology majors, the department also provides service courses for other programs. The department offers both a major and a minor in biology. Public service activities are primarily directed to the regional needs of West Tennessee. Research for the purpose of faculty and student growth and development is encouraged.

## **Expected Outcomes**

Upon completion of the Biology major the graduating senior is expected to:

- have a working knowledge of the diversity of life,
- have a working knowledge of cell biology, genetics, ecology and evolutionary processes,
- have a basic understanding of the history and future of the discipline,
- have a good understanding of ethical and moral issues associated with the discipline,
- be knowledgeable on how to access and study original biological literature,
- have a basic knowledge on how to write a scientific paper on a biological subject using acceptable standards of style, formatting and proper literature citations,
- have an understanding that biology is a discipline that requires “life-long” learning,
- undertake intellectually challenging tasks and use knowledge and technology to solve problems and score at or above the national mean on the Biology Major Field Examination.

## **Facilities**

The Biology Department and faculty offices are located in Brehm Hall. The department directs teaching and research activities on campus and at the teaching and research facility located on Reelfoot Lake. The

Department of Biological Sciences is affiliated with the Gulf Coast Research Laboratory at Ocean Springs, Mississippi, where a full summer program of courses is offered.

## Student Organizations

**Tri Beta Honorary Biological Society.** Beta Beta Beta Biological Honor Society was established as a society for undergraduate students. It emphasizes a three-fold program: stimulation of scholarship, dissemination of scientific knowledge and promotion of biological research. Therefore, BBB gives students the opportunity to report on their findings in the lab through *BIOS*, the journal of the society. Published since 1930, *BIOS* is a quarterly journal which publishes articles of interest to the society, articles written by undergraduates and articles of general biological interest.

**Mu Epsilon Delta Pre-Health Science Fraternity.** Mu Epsilon Delta is a pre-health science organization composed of Biology, Chemistry and other majors dedicated to promoting the health sciences. Its mission is to assist students in the pre-health sciences by sponsoring seminars, visits with health science professionals, tours of professional schools, etc. and fellowship with students, teachers and professionals, who are interested in health science professions.

## Biology Major

**B.S. Curriculum.** The Department of Biological Sciences offers three concentrations leading to the Bachelor of Science degree. A minor is not required. No more than four credit hours of research participation (Biology 451-452, Microbiology 453-454) may be counted toward the major. Majors in any concentration are required to complete all of the general education requirements for the Bachelor of Science degree.

While there are several courses that each of the concentrations share, significant differences in specific prerequisites and requirements do exist. Students should work closely with their academic advisers in order to prepare a course of study.

**Concentration in Cell and Molecular Biology (6211).** The concentration in Cell and Molecular Biology is supported by coursework from the Departments of Chemistry; Mathematics and Statistics; and Geography, Geology, and Physics and is composed of 45 hours of courses from the Department of Biological Sciences as detailed below.

Required Courses: (Students must earn a grade of C or better in each of the following courses.)

*Supporting courses:*

Chemistry	Chemistry 121, 122, 341 and 342
Mathematics	Mathematics 210 and either Mathematics 160 or 251
Physics	Physics 211 and 212

*Biology Requirements:*

Biology	Biology 130; 140; 331 or 391; 336; 337; 338; 410, 411, 412 or 413; 436; 437
Microbiology	Microbiology 310

*Electives*

Seventeen additional hours selected from upper-division courses offered by the Department of Biological Sciences. Four hours of 200-level courses may be used to satisfy the elective requirement, excluding Microbiology 251. Up to four hours of Biochemistry may be used to satisfy the elective requirement. Students must earn a grade of C or better in all elective courses.

**Concentration in Organismal Biology (6212).** The concentration in Organismal Biology is supported by coursework from the Departments of Chemistry and Mathematics and Statistics and is composed of 45 or 47 hours of courses from the Department of Biological Sciences as detailed below.

**Required Courses:** (Students must earn a grade of C or better in each of the following courses.)

**Supporting courses:**

Chemistry	Chemistry 121, 122 and either 310 (and 319) or 341
Mathematics	Mathematics 210 and either Mathematics 160 or 251

**Biology Requirements:**

Biology Biology 130; 140; 331; 336; 391; 410, 411, 412 or 413

Cell Biology or  
Microbiology Biology 337 (and 338) or Microbiology 310

Botany Select one course from Botany 301, 302 or 303

Invertebrate Zoology Select one course from Zoology 315, 325, 326 or 440

Vertebrate Zoology Select one course from Zoology 201, 251, 319, 320, 321, 322 or 352

**Electives:**

Fourteen or 15 additional hours selected from upper-division courses offered by the Department of Biological Sciences. Four hours of 200 level courses may be used to satisfy the elective requirement, provided that no 200 level course is selected to satisfy the Vertebrate Zoology requirement. Microbiology 251 may not be used for elective credit if Microbiology 310 is used to satisfy the Cell Biology and Microbiology requirement. Students must earn a grade of C or better in all elective courses.

**Concentration in Environmental Biology (6213).** The concentration in Environmental Biology is supported by coursework from the Departments of Agriculture and Natural Resources; Chemistry; Mathematics and Statistics; and Geography, Geology and Physics and is composed of 45 hours of courses from the Department of Biological Sciences as detailed below.

**Required Courses:** (Students must earn a grade of C or better in each of the following courses.)

**Supporting courses:**

Chemistry	Chemistry 121, 122, and either 310 (and 319) or 341
Mathematics	Mathematics 210 and either Mathematics 160 or 251

**Biology Requirements:**

Biology Biology 130, 140, 336, 391, and either 410, 411, 412 or 413

Botany Botany 303

Ecology Biology 331; 443; and either Botany 431 (and 432) or Zoology 441 (and 442)

Professional Skills: In addition to the basic skills provided by successful completion of the required supporting courses above, students in the Environmental Biology concentration are required to complete two of the following courses. Student must earn a grade of C or better in each of the selected courses: Agricultural Engineering Technology 482, Chemistry 320, Geography 310, 364

**Electives:**

Seventeen additional hours selected from upper-division courses offered by the Department of Biological Sciences. Four hours of 200-level courses may be used to satisfy the elective requirement. Eight or nine of the hours must be selected from the following Environmental Electives. The remaining hours may be selected from any of the courses offered by the department. Credit may not be received for both Microbiology 251 and Microbiology 310. No more than four hours of courses taught by other departments may be used to satisfy the elective hours. Students must earn a grade of C or better in all elective courses.

**Environmental**

**Electives:**

Biology 418, 444, 475; Botany 302, 431, 432; Plant Science 341; Soil Science 430; Zoology 315, 319, 320, 321, 322, 325, 326, 440, 441, 442, 443

## Biology Minor

A minor consists of Biology 110-120 or Biology 130-140 and 13 hours selected from courses numbered 300 or above in Biology, Botany, Microbiology and Zoology.

### Description of Courses Available at the Gulf Coast Research Laboratory

The University of Tennessee at Martin is affiliated with the Gulf Coast Research Laboratory (GCRL), Ocean Springs, Mississippi, for the purpose of training in the marine sciences. The GCRL is administered by the University of Southern Mississippi. Institutional affiliation allows students at the University of Tennessee at Martin to enroll at the GCRL for summer courses without paying out-of-state fees.

Course offerings are announced annually by the GCRL and are available from the on-campus coordinator, Department of Biological Sciences, UT Martin. Application forms must be completed as early as possible and not later than April 30 of the year of intended attendance.

Additional information may be obtained from the Gulf Coast Research Laboratory On-Campus Coordinator, Department of Biological Sciences, The University of Tennessee at Martin.

**Biology 405 Marine Ecology** (5) A consideration of the relationship of marine organisms to their environment. The effects of temperature, salinity, light, nutrient concentration, currents, food, predation and competition on the abundance and distribution of marine organisms are considered. *Prereq: Sixteen hours of biological sciences, including general zoology, general botany and invertebrate zoology.*

**Biology 407 Principles of Marine Aquaculture** (6) An introduction to principles and technologies applied to the culture of commercially important marine organisms. *Prereq: Sixteen hours of biological science.*

**Biology 459 Coastal Ecology for Teachers** (4) Course provides teachers with background in basic coastal ecology, enhancing awareness and understanding of marine and aquatic environments. *Prereq: Consent of instructors.*

**Botany 420 Marine Phycology** (4) A survey, based upon local examples of the principal groups of marine algae and marine flowering plants, treating structure, reproduction, distribution, identification and ecology. *Prereq: Ten hours of biology, including botany.*

**Botany 422 Coastal Vegetation** (3) A study of general and specific aspects of coastal vegetation, with emphasis on local examples. *Prereq: Ten hours of biology, including general botany.*

**Botany 423 Salt Marsh Plant Ecology** (4) Species composition of tidal marshes, vegetational structure and distribution of salt marshes, with emphasis on flowering plants of local marshes, salt tolerance, adaptation, reproduction, primary production, water filtering capacity and the effect of physical factors on plant growth and life cycles are considered. Techniques used to establish new marshes are also explored. *Prereq: General botany (plant taxonomy, plant physiology, plant morphology and general ecology helpful) or consent of instructor.*

**Marine Science 300 Marine Science I; Oceanography** (5) An introduction to oceanography which integrates physical, geological, chemical and biological oceanography to provide students a multidisciplinary foundation in the fundamentals of oceanography. *Prereq: College algebra, one semester of chemistry, geology and physics courses helpful, but not required.*

**Marine Science 301 Marine Science II: Marine Biology** (5) General introduction to marine biology with emphasis on local fauna and flora; their habitats, life cycles and survival strategies. *Prereq: Eight semester hours of biological sciences.*

**Marine Science 457 Marine Science for Teachers** (3) A course designed to introduce students, particularly in-service teachers, to the study of marine science and to promote the teaching of marine biology at all grade levels. *Prereq: Biology background or consent of instructor.*

**Marine Science 458 Marine Science for**

**Elementary Teachers** (3) A course designed to prepare teachers of elementary grade children to conduct classes using marine-related materials.

*Prereq: Six hours in biological sciences.*

**Marine Science 482 Coastal Marine Geology**

(3) A study of inshore and nearshore geological processes, sedimentation patterns and land form development. *Prereq: Six hours of geology.*

**Marine Science 492 Applications of Biotechnology in Marine Biology**

(6) Introduction to basic biochemical and molecular techniques used in research in the fields of systematics, fisheries science, aquaculture and aquatic toxicology. *Prereq: Eight semester hours of zoology, general and organic chemistry, biochemistry recommended or permission of course coordinator.*

**Microbiology 409 Marine Microbiology**

(5) The role of microorganisms in the overall ecology of the oceans and estuaries. *Prereq: General microbiology and environmental microbiology or consent of instructor.*

**Zoology 403 Marine Invertebrate Zoology**

(5) A concentrated study of the important free-living, marine and estuarine invertebrates of the Mississippi Sound and adjacent continental shelf of the north-eastern Gulf of Mexico, with emphasis on structure, classification, phylogenetic relationships, larval developmental and functional processes. *Prereq: Sixteen hours of zoology, including at least an introductory course in invertebrate zoology.*

**Zoology 404 Parasites of Marine Animals**

(6) A study of the parasites of marine estuarine animals, with emphasis on morphology, taxonomy,

life histories and adaptations of animals commonly found associated with tidal marshes, seagrasses and sand beaches, with emphasis on those occurring in the northern Gulf of Mexico. Abiotic and biotic factors controlling or limiting the occurrence and distribution of fauna in these three habitat types will be compared and contrasted. *Prereq: Sixteen hours of biological sciences and junior standing or consent of instructor.*

**Zoology 408 Marine Ichthyology** (6) Major piscine taxa occurring in the Mississippi Sound and adjacent habitats, principles involved in their classification and taxonomy, their morphological, physiological and ecological adaptations and the evolutionary relationships of these organisms. *Prereq: Sixteen hours of zoology, including comparative anatomy or consent of instructor.*

**Zoology 410 Marine Fisheries Management**

(4) An overview of practical marine fishery management problems. *Prereq: Consent of instructor.*

**Zoology 420 Marine Mammals** (5) An examination of the natural history and population ecology of cetaceans, including life history, distribution, population dynamics, diet and feeding, social structure, evolution and zoogeography. Pinnipeds, sirenians, sea otters and the polar bear will also be included. *Prereq: Twelve semester hours of biology including Marine Science II or Marine Ichthyology.*

**Zoology 406 Fauna and Faunistic Ecology of Tidal Marshes, Seagrasses and Sand Beaches**

(5) A survey course dealing with the taxonomy, distribution, trophic relationships, reproductive strategies and host-parasite relationships. *Prereq: General parasitology or consent of instructor.*

## Courses Offered by Department of Biological Sciences

Biology 110 Introductory Cell Biology and Genetics (F, Sp, Su)

Biology 120 Introductory Plant and Animal Biology (F, Sp, Su)

Biology 130 Principles of Biology I (F, Sp, Su)

Biology 140 Principles of Biology II (F, Sp, Su)

Biology 180 Special Topics in Biology (as needed)

Biology 300 Medical and Scientific Vocabulary (F, Sp)

Biology 331 General Ecology (F, Sp)

Biology 336 Introductory Genetics (F, Sp)

Biology 337 Cell Biology (F, Sp)

Biology 338 Cell Biology Laboratory (F, Sp)  
Biology 391 Organic Evolution (F, Sp)  
Biology 410 Seminar in Biological Sciences (F, Sp)  
Biology 411 Seminar in Biological Sciences (F, Sp)  
Biology 412 Wildlife Biology Seminar (F)  
Biology 413 Wildlife Biology Seminar (Sp)  
Biology 418 (618) Limnology (F-odd)  
Biology 432 (632) Developmental Biology (Sp-even)  
Biology 436 Molecular Biology (F, Sp)  
Biology 437 Molecular Biology Lab (F, Sp)  
Biology 443 Ecological Methods (F)  
Biology 444 Conservation Biology (Sp-even)  
Biology 451-452 Research Participation (F, Sp)  
Biology 462-463 (662-663) Special Topics in Biology (as needed)  
Biology 475 Field Investigations in Biology (Sp)  
Botany 301 Foundations of Botany (F)  
Botany 302 Plant Morphology (Sp)  
Botany 303 Plant Taxonomy (Sp)  
Botany 421 (621) Plant Function and Development (Sp-even)  
Botany 431 (631) Plant Ecology (F)  
Botany 432 (632) Plant Ecology Laboratory (F)  
Microbiology 251 General Bacteriology (F, Sp, Su)  
Microbiology 310 General Molecular Microbiology (F, Sp)  
Microbiology 311 Public Health Microbiology (Sp)  
Microbiology 401 (601) Immunology (F)  
Microbiology 402 (602) Immunology Laboratory (F)  
Microbiology 410 Microbiology of Foods (F)  
Microbiology 420 Virology (F)  
Microbiology 453-454 (653-654) Research Participation (F, Sp)  
Zoology 201 Human Anatomy and Physiology (F, Sp, Su)  
Zoology 251 Human Anatomy and Physiology I (F, Sp, Su)  
Zoology 304 Comparative Vertebrate Anatomy (as needed)  
Zoology 315 Invertebrate Zoology (Sp-even)  
Zoology 319 Mammalogy (F)  
Zoology 320 Ichthyology (Sp)  
Zoology 321 Ornithology (Sp)  
Zoology 322 Herpetology (F-even)  
Zoology 325 Economic Entomology (F)  
Zoology 326 (526) Aquatic Macroinvertebrates (Su)  
Zoology 328 Natural History of the Vertebrates (as needed)  
Zoology 352 Human Anatomy and Physiology II (F, Sp, Su)  
Zoology 440 (640) General Parasitology (Sp-odd)  
Zoology 441 (641) Animal Ecology (F)  
Zoology 442 (642) Animal Ecology Laboratory (F)  
Zoology 443 Animal Behavior (Sp-odd)  
Zoology 461 (661) Histology (Sp-even)  
Zoology 710 Entomology for Teachers (as needed)

*Complete course descriptions can be found in the Course Description section of the catalog.*